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Stored Program Controlled Network:

Data Base Administration System—Overall Description and Operational Characteristics

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Large amounts of data about every customer line number and billing number in the country must be available for the Stored Program Controlled (SPC) Network features to operate. A method of obtaining, organizing, and cleansing the data or administering the necessary network data bases was needed. While much of the data could be obtained through each telephone company's service order system, these systems vary substantially in capabilities from one company to another and even from one region to another of the same company. To obtain the data, a new support system called the No. 2 Data Base Administration System (DBAS) was designed and new operational procedures for the telephone companies were developed. The DBAS interacts with all types of service order systems to obtain the data; provides initial load, as well as immediate and routine updates for the network data bases; and handles customer queries, statistics, special studies and other administrative functions off-line for the data bases. This minicomputer-based system bridges the gap between the telephone company paper flow and the SPC network. The DBAS provides reliable data in a timely fashion to the network to ensure the viability of the initial features. It provides a general capability for administration of additional customer data which may be required for future SPC network features.

I. INTRODUCTION

As discussed in companion articles of this issue of *The Bell System Technical Journal*, large amounts of data on every customer billing

number (a line number or special billing number) in the country must be available to various nodes in the SPC network for the network features to function properly. (See Ref. 1 for a discussion of the on-line data bases.) A method of obtaining, organizing, and cleansing the data, that is, administering the network data bases or Billing Validation Applications (BVAS), is needed. While the data can be obtained through each telephone company's (Bell or independent operating company) Service Order System (SOS), these systems vary significantly in capabilities and design from one telephone company to another and even from one region to another of the same company. Further, no existing telephone company administration system had all of the SOS data currently used or envisioned for SPC network features.

To obtain the data and provide the administrative functions, a new support system called the No. 2 Data Base Administration System (DBAS) was designed. [The No. 1 DBAS administered data bases in Automatic Intercept System (AIS) switching machines.] The operations of the Data Base Administration Center (DBAC), the telephone company center which operates the DBAS, were revised to reflect its new capabilities.

By defining a specific interface, DBAS interacts with all types of SOSs to obtain the necessary data. The DBAS will accept data link, magnetic tape, and manual clerk input, thus functioning in all of the modes of telephone company data entry for SOS information.

The DBAS is connected by one dedicated data link to each BVA containing billing number records administered by that DBAS. It is expected that, in most cases, there will be only one or two BVAS attached to a single DBAS, although the DBAS is designed to handle up to four BVAS. Backup links are also provided for use when dedicated link failures occur. A backup terminal, connected to each BVA by a dedicated link, is located at the DBAC for use in accessing the BVA.

The DBAS provides the means for initially loading, as well as updating, the BVA. It is also capable of auditing the BVA for inconsistencies and of restoring some or all of the BVA, if a catastrophic failure (both active disks and both backup disks are lost) occurs at the BVA. From the telephone company's viewpoint, the DBAS is the primary repository for the information that comprises the BVA, and for the information that is needed to administer the various features. That is, the DBAS contains a superset of the BVA information. (The BVA contains only those items needed by the requesting nodes for the on-line processing and billing of calls.) This superset of BVA information is stored in a data base at the DBAS. The DBAS also handles customer inquiries, statistics, and other administrative functions associated with the SPC network features. Thus, these functions are performed off-line from the switching network.

This minicomputer-based system bridges the gap between the telephone company paper flow and the SPC network. The DBAS provides reliable data in a timely fashion to the network to ensure the viability of the initial features. It provides a general capability for administration of additional customer data which may be required for future SPC network features.

II. SERVICE ORDER DATA

All customer Billing Number Record (BNR) activity originates in either a Public Service Marketing Center, Residence Service Center, or Business Service Center. The AT&T recommendation is for the record of this activity to be transmitted by service order. Standard Universal Service Order Codes (USOCs) and Field Identifiers (FIDs) have been developed to accommodate all data required to support Calling Card Service features. However, some companies may also transmit selected data by miscellaneous form or memo. All data are obtained from completed service orders with the exception of public, semipublic, and coinless Originating Station Treatment (OST) data, which are obtained from precompleted service orders.

Both the DBAS and BVA data bases are designed so that the data forwarded by the SOS are stored by utilizing the 10-digit telephone number (NPA-NXX-XXXX) or special billing number (RAO* 0/1 XX-XXXX) as the address. Furthermore, the data themselves are logically grouped into four categories corresponding to the features offered by Calling Card Service. These categories are as follows:

(*i*) Originating station treatment—The service order contains USOC information for each line, indicating whether that line has *Touch-Tone*† or rotary dial capability. It may also contain, at the customer's request, FID information if special OST is desired. These data are used to determine the protocol returned to the calling station (Tone, Tone and Announcement, or Operator Assistance) on 0+ calls.

These data are translated by the SOS and transmitted in the appropriate format to the DBAS.

(*ii*) Public telephone check (PTC)—The service order also contains a USOC which identifies the class of service for each line, i.e., residence, business, public, semipublic, or coinless. These data are used to determine if special operator handling is required on collect or bill-to-third-number calls.

(*iii*) Billed number screening (BNS)—The service order contains an FID providing toll billing exception for those customers that request

(*a*) no collect or bill-to-third-number calls

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* Revenue Accounting Office.

† Registered service mark of AT&T.

(*b*) no bill-to-third-number calls

(*c*) no collect calls.

(*iv*) Calling Card Validation—Finally, the service order contains a USOC which indicates the assignment of Calling Card service. This information is transmitted from the SOS to the Customer Record Information System (CRIS). The CRIS, upon receipt of these data, uses an algorithm to generate a four-digit personal identification number (PIN) which is associated with the billing number. On a daily basis, the CRIS system forwards the billing number + PIN information to the DBAS.

A block diagram indicating the source and flow of data is shown in Fig. 1.

In summary, BNR information is recorded on service orders. This information is then transmitted by locally developed SOSS directly to DBAS and CRIS. The CRIS generates Calling Card Service information and transmits these data to the DBAS.

III. SYSTEM ARCHITECTURE

The detailed system architecture of DBAS is the subject of a companion paper appearing in this issue. However, a high-level description of the architecture will be provided here as an aid to the reader in understanding the remainder of this paper.

Figure 2 is a simplified block diagram showing the functional relationship of the No. 2 DBAS programs associated with processing updates to the DBAS and BVA data bases.*

As noted previously, updates are entered into the DBAS from paper records, magnetic tape, or via high-speed data link. The DBAS programs associated with these three types of data entry are CLERKIN, READTAPE, and LINKIN, respectively. These programs check the data input for syntax, completeness, and self-consistency, and they output a logical grouping of 1 to 256 updates called a session file. Each completed session file is linked both to the Journal Program (JURNL) and order processors. The journal program copies the sessions to magnetic tape so that they may easily be reinput if a system malfunction should occur before they are completely processed.

Operating independently from JURNL, the order processor programs also begin their work. For a given update, the associated BNR information is retrieved from the data base and, using this additional information, further consistency checks are performed on the input record. If the record passes the checks, the DBAS data base is modified and an update for the BVA is generated. When an entire session is

* Programs associated with processing AIS and TSPS updates are not shown.

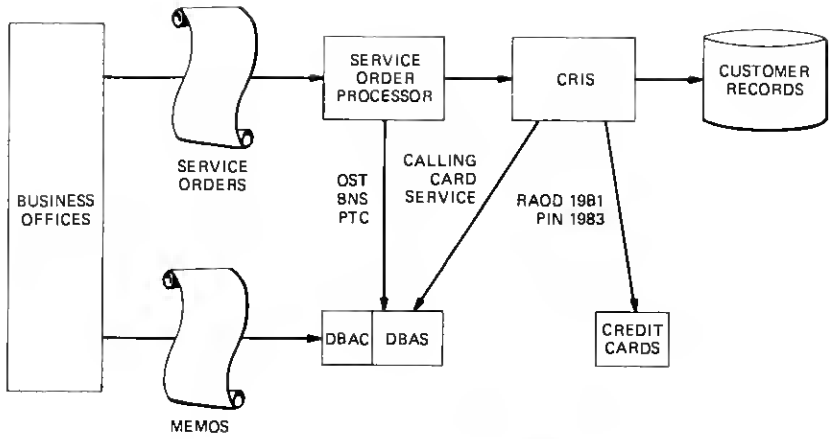

Fig. 1—Service order process.

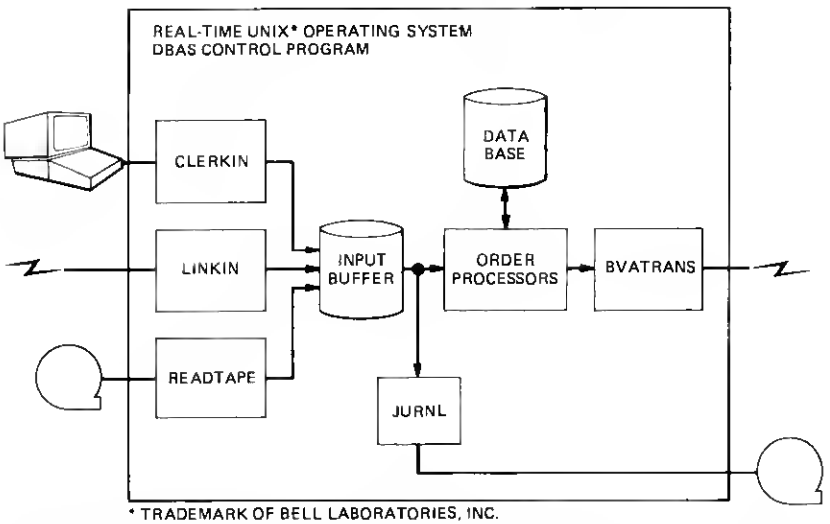

Fig. 2—Data Base Administration System 2DB3 system architecture. (AIS and TSPS programs and interfaces not shown.)

processed, the associated group of updates (also called a session) is passed to the BVA transmission program (BVATRANS).

If a session passed to BVATRANS is designated high priority, BVATRANS will immediately transmit the associated updates to the BVA. All other sessions will wait until a designated time, usually during the middle of the night (the lowest traffic period for the BVA), to be processed. At that time, BVATRANS will sort the updates in order of

input data. Errors found are printed on the DBAC line printer for subsequent investigation.

The magnetic tapes read are industry standard, nine-track, and employ recording methods and densities which meet the American National Standards Institute (ANSI) specifications. Both 1600-cpi, Phase Encoded (PE) and 800-cpi, non-return-to-zero, change-on-ones (NRZI) tapes can be utilized.

Input tapes must adhere to the following format. First, there is an 80-character block termed the "Volume Header Label," which identifies the physical reel of magnetic tape. This is followed by another block of 80 characters called the "File Header Label," which identifies the contents of the "file," that is, the data recorded on the tape.

The file is a collection of input records containing BNS, Calling Card Service, PTC, OST, and AIS data. The input records are grouped into sessions, where the input records in a session have all come from the same source (e.g., the same telephone company). Multiple sessions on a tape must be used to separate input records from different telephone company or different regional SOSS within a telephone company. The maximum number of input records per session is generally limited to 256. Each session is started by a session header which indicates the source of the data (the telephone company). An "End-Of-File Label" follows the file. This is an 80-character block which identifies the end of all input data records recorded on the tape. Also recorded on the tape are single-character blocks containing a Device Control (DC3) character. These are termed "tape marks." One tape mark precedes the file, one succeeds the file, and two follow the End-of-File Label.

VI. SERVICE ORDER DATA-LINK INPUT—LINKIN

The DBAS data-link input program, LINKIN, provides the capability to receive service order information on a real-time basis from a single telephone company SOS. This method of operation has advantages over magnetic tape input in that it allows immediate updates to be input without the manual intervention of DBAS clerks. Data-link input is otherwise functionally equivalent to tape input. That is, the format of sessions input to, and output from, the LINKIN program are essentially identical to those associated with the READTAPE program. In addition, the consistency and syntax checks performed by the two programs are also identical.

The communication protocol used for the data-link input is BX.25, which has been adopted as the Bell System standard for communication between Operations Support Systems, and between these systems and SPC switching systems. The physical data link consists of two four-wire private lines. Data are normally transmitted over only one of the lines, with the alternate line serving as a "hot" standby. In case of

excessive transmission errors, the data flow is automatically switched from the active line to the standby without loss or duplication of information. Communication over the link is full-duplex synchronous at a speed of 4800 baud.

VII. JOURNAL TAPE—JURNL

The JURNL program functions to produce a journal tape which is the image of the on-line data base additions and modifications from the CLERKIN and LINKIN processes since the beginning of the work day. The READTAPE input may also be journaled to consolidate magnetic tapes. In the case of a system failure, if the integrity of the on-line data base is in doubt, the system may be restored, using the journal tapes to efficiently reinput the day's updates.

Tapes produced by the JURNL process are compatible with the requirements of READTAPE. To assure compatibility, journal tapes are created in the same format described previously for the READTAPE process, PE and 800 or 1600 cpi.

The production of a journal tape involves the interchange of messages with the console operator. Messages to and from JURNL pass through a control program (CONTROL) and follow the formats specified therein. These messages are invaluable aids to procedures, such as tape mounting and dismounting, tape mount verification, system shutdown, and system restart. The messages also highlight operator or tape errors. For example, it is in the best interest of DBAS to have a journal tape mounted whenever input sessions are being processed. The following error message is printed regularly whenever input sessions are in the journal directory but when no tape is being written.

++(jurnl) SESSIONS ARE WAITING TO BE JOURNALED,
PLEASE MOUNT JOURNAL TAPE

The JURNL program is started by CONTROL when DBAS is started and runs continuously until the operator requests either a total system shutdown or a selective process shutdown. The JURNL program, however, will only write to tape after operator action. After a shutdown, JURNL ceases to exist. It will be automatically started the next time DBAS is started, or the operator may restart it manually.

VIII. ORDER PROCESSING

As was described above, in general, the order processing programs accept sessions from the input programs, update the DBAS data base and/or generate updates for the BVA transmission program. Also, since the order processing programs have access to the data base records, they can perform certain additional consistency checks which the

Table II—Order processor functions

Order Processor	Accepts Input From	Reads Data Base (BNRs)	Performs Consistency Checks	Writes Data Base (BNRs)	Generates BVA Updates
ILOP	Magnetic tape	No	Yes	Yes	Yes
UOP	Clerk, data link, magnetic tape	Yes	Yes	Yes	Yes
POP	Not applicable	Yes	No	Yes	Yes
MOP	Not applicable	Yes	No	No	Yes

input programs could not. Any inconsistencies are reported to the DBAC via exception reports written to the line printer.

In actuality, there are four different order processor programs. These are the Update Order Processor (UOP), the Initial Load Order Processor (ILOP), the Pending Order Processor (POP), and the Move Order Processor (MOP). Each of these is discussed briefly below. Table II summarizes the functions performed by each order processor.

8.1 Update order processor

There are four UOP programs which process daily updates from the CLERKIN, READTAPE, and LINKIN programs. Multiple UOPs are used to implement the requirements for handling various updates at different levels of priority.

One UOP processes only immediate, or high-priority updates. Immediate updates can be generated by CLERKIN or LINKIN (but not by READTAPE) to handle denials, restorals, or customer trouble reports. Since one UOP is dedicated to handling immediate updates and because the number of immediate updates required is relatively small, an immediate update is processed and ready for transmission to the BVA within 10 minutes. Naturally, if the immediate updates were handled by the same UOP as lower priority updates, processing time would be extended as a result of the intermingling of updates. Otherwise, a more complex program would be required to allocate resources appropriately.

For similar reasons, another UOP is dedicated to handling non-high-priority clerk updates. Thus, since the number of these clerk updates is generally small compared to the mechanized input, clerk updates get processed relatively quickly (within 1 hour) also.

Finally, the third and fourth UOPs are dedicated one each to READTAPE and non-high-priority LINKIN inputs. Since the quantity of mechanized updates is relatively large, and handled on a first-come, first-served basis, these updates are given resultantly lower priority handling by default.

8.2 Initial load order processor

The ILOP is the order processor used to perform an initial load or reload of the DBAS data base.

Since several million records may have to be loaded initially, input for the ILOP must be provided in a special restricted format to speed processing. The ILOP accepts only input from READTAPE. Furthermore, the initial load tape must be organized in sessions each of which consist of all the BNRs for a given Billing Number Group (BNG). After performing syntactical checks, the ILOP places the records in the session in an order required for the data base to store the entire session efficiently rather than store each record individually. In addition, the ILOP provides the session to BVATRANS for subsequent transmission to the BVA.

8.3 Pending order processor

A pending order is an update for Calling Card Service data which was input via one of the input programs with an effective date sometime in the future. That is, it is a Calling Card Service update which must take effect 24 hours or more later than the time on which it was entered. For instance, if a customer telephone number change is to take place seven days in the future, a pending order must be generated to delete the PIN from the old number on that effective date. The POP is the program which searches the DBAS data base for pending orders having a given effective date, updates the data base with the pending data, and generates the appropriate update to pass on to BVATRANS for transmission to the BVA. The POP is normally run manually once a day after regular updating is complete.

8.4 Move order processor

The MOP is actually not an order processor, but simply a program which can read BNRs from the DBAS data base and supply the records to BVATRANS for transmission to the BVA. Thus, it provides a means to restore the BVA data base directly from the DBAS data base should such a need arise.

IX. DATA BASE ADMINISTRATION SYSTEM—INTERNAL DATA BASE

The DBAS internal data base contains the data needed by the BVA and associated data for off-line activities, such as customer inquiries. There is a BNR for each billing number assigned to the DBAS. The data kept for each BNR is shown below, with the default values (that is, the meaning of the absence of data in a given field) in italics.

(*i*) OST indicator: Customer-requested, tone, tone and announcement, cut through to an operator, or *none*

(*ii*) Service indicator: *Touch-Tone* service, rotary dial service, or *unknown*

(*iii*) PTC data: Public coin, public-coinless, semipublic-coin, business, or residence, or *unknown*;

(*iv*) BNS code: Customer requested no bill-to-third number, no collect, no bill-to-third number or collect, or *no restrictions*

(*v*) Unrestricted PIN (*no PIN*)

(*vi*) Service denial bit for unrestricted PIN (*no service denial*)

(*vii*) Service start for unrestricted PIN date (*no date*)

(*viii*) Restricted PIN (*no PIN*)

(*ix*) Service denial bit for restricted PIN (*no service denial*)

(*x*) Service start date for restricted PIN (*no date*)

(*xi*) Date of most recent DBAS data base update activity and medium (clerk, tape, or data link) of the update for this record (*no date, no medium*) and priority of last update

(*xii*) Counter to indicate the number of pending orders for this BNR (*zero*).

When an update results in default values for all data items in a billing number record (except for item *xi*), the DBAS deletes this billing number record from its data base.

The data kept for a billing number group (i.e., BNG—the 10,000 numbers with common NPA-NXX or RAO 0/1XX) include:

(*i*) Status: *Vacant*, nonparticipating, no input allowed, local administration or active administration for BVA administration*

(*ii*) Date that each feature (Calling Card Services, BNS, and OST) was activated in the BVA. *No date* indicates that the feature is not enabled.

(*iii*) Current RAO† (*no* RAO): This RAO corresponds to the RAO stored in the BVA for the billing purpose.

(*iv*) Previous RAO (*no* RAO): This RAO should be the same as the current RAO code for the BNG. It corresponds to the RAO stored in the BVA for the RAO digit (RAOD) check.

(*v*) Ownership: Telephone company that owns this BNG (*no* ID)

(*vi*) BVA(s) identity: Where this BNG resides (*no* BVAs)

(*vii*) Activity counts: Number of inserts, deletes, or changes since last daily report (*zero for all*)

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* Vacant means that the BNG is vacant and no BNR input is allowed; nonparticipating means that the BNG is active, but no billing number records are associated with the BNG; local administration means that no BNR updates are being sent to the BVA(s); no input allowed means that the BNG is being moved or restored; active administration means that the BNR updates are being forwarded to a BVA.

† When changing the RAO code for the BNG, the new RAO should be entered as the current RAO and forwarded to the BVA. After the transition period of RAO change is over, the DBAC personnel should manually reset the previous RAO to be the same as the current one.

(*viii*) Date that the billing number records in this BNG were initially loaded in the DBAS data base. *No date* indicates that the data are not loaded.

The DBAS data base interfaces functionally in two ways with the rest of the system. It provides administrative data for reports and studies, and it supports order processing, which consists of insertion, deletion, and changes to records in the data base.

9.1 Administration of data base

There are two DBAS administration programs, GETBNG and GETBNR, which permit the DBAC administrator to access the data base information described above. First, before any BNR information can be entered into the data base, the GETBNG program must be used to initialize, for administration, the appropriate BNG records. This program has the capability of inserting, updating, deleting, or listing any information in the BNG record. Second, a listing of the BNR data (which was entered through the CLERKIN, LINKIN, or READTAPE programs) is provided by the GETBNR program. Thus, the DBAC administrator can easily determine the contents of any BNR record in the data base.

X. BILLING VALIDATION APPLICATION TRANSMITTER—BVATRANS

The BVA transmission program (BVATRANS) is responsible for controlling the flow of all updates from the DBAS to the BVA(s). To do this, BVATRANS operates on files of BVA updates produced by the seven order processor programs discussed above. These operations include sorting, formatting, and transmitting immediate and batch updates.

The sorting operation is required to group all updates for BNRs within a given BNG. Transmission of updates grouped in this way saves a considerable amount of BVA real time. In addition, the sorting operation helps BVATRANS to prevent the possible overwriting of an immediate update by an earlier batch update which is transmitted at a later time.

XI. SYSTEM ADMINISTRATION

In addition to the programs associated directly with the data base updating functions, which were described above, the DBAS provides a set of system administration programs. These programs fall into two broad categories: (*i*) system parameter generation and (*ii*) report generating. The system parameter generation programs allow the system administrator to describe the hardware configuration of the particular DBAS and generate various system tables and files which are unique to that site's operations. The report-generating programs provide statis-

tics describing various aspects of the daily operations and the status of system processes and files.

The specific functions of these administrative programs are described in more detail below.

11.1 System parameter generation

There are four major administrative programs which are used to define data unique to a particular DBAS. These programs are SYSGEN, CLOSTRANT, ACCESSRST, and ORDERTYPE.

11.2 SYSGEN

SYSGEN is the administrative program used to define various parameters associated with the AIS, TSPS, and BVA interfaces and to define clerk login IDs. In addition, it is also used to define optional peripheral equipment including tape drives, disk drives, terminals, and data links. Because of this, the SYSGEN program must be run before updating and other system activities can begin.

Generally, the first time the SYSGEN program is run, the initialization function is performed to establish values for all of the required system parameters. When performing the initialization function, the SYSGEN program prompts the user with a question and the user responds with the appropriate value for that particular parameter. When all of the parameters have been initialized, the user "quits" the program, thus causing the parameter file just created to be stored on the system disk for subsequent use by all other programs.

After the first parameter initialization is completed, other functions which may be performed by SYSGEN include:

(*i*) Update—change the current value of a specified parameter
(*ii*) Print—print all or any data parameter
(*iii*) Backup—save all parameters on magnetic tape
(*iv*) Restore—transfer all parameters from magnetic tape to disk.

It was noted above that SYSGEN is an interactive program, that is, the program prompts the user for appropriate responses. However, as is the case for most all of the DBAS programs, SYSGEN can also operate in a command mode, whereby an experienced user can input on one line data normally input on several lines in response to several SYSGEN prompts.

11.3 CLOSTRANT

The system administrator uses the CLOSTRANT program to build a Class of Service Translation Table. This table is then used by the DBAS data input programs (CLERKIN, READTAPE, and LINKIN) to translate the class of service code on the service order to one of the six internal class of service codes used by the DBAS and BVA. A translation of this

type is required since a telephone company may need several hundred different class types to define all of the different categories of telephone service which are tariffed (and so appear on the service order), whereas, from the DBAS and BVA viewpoint, program efficiencies are gained by having to work internally only with the six classes which completely define the service for the line from the standpoint of the Calling Card Service, BNS, OST, and PTC features.

The actual CLOSTRANT table built by the administrator consists of up to 750 entries, each of which gives the internal DBAS class of service code which was assigned to the particular USOC. The CLOSTRANT program provides commands to edit and print the table, while magnetic tape backup and restore for the table are provided by the corresponding SYSGEN features.

11.4 ACCESSRST

The ACCESSRST program is used by the administrator to define which clerks and which telephone company will be allowed access to given sets of BNGs for updating purposes. For example, to provide access restrictions for data input via clerk terminal, a table is built for each clerk ID specifying whicb BNGs can be accessed under that ID. Likewise, to provide access restrictions for data input via magnetic tape or data link, a table is built for each telephone company ID specifying which BNGs can be accessed by that telephone company. These access restrictions help ensure that billing number record data are not modified from an unauthorized source.

The ACCESSRST program provides commands to initialize a new table, modify, delete, and print existing tables, or create a new table which is identical to an existing table. Tables are named C100 to C999 and T000 to T255 for the corresponding clerk and telephone company IDs, respectively.

11.5 ORDERTYPE

As was described above, the clerk input program is an interactive data entry system based upon a sequence of up to 32 questions which the clerk answers from information on the service order or a trouble report. To maximize the efficiency of the entry process, the sequence of questions asked is based upon the order-type code entered by the clerk. This order-type code is the second question asked and is preceded only by the entry of the billing number.

Using the ORDERTYPE program, the DBAS administrator creates and maintains a file which defines the question sets for up to 64 order-type codes. In addition to specifying the question sets, the administrator defines which questions the clerk may skip and which questions will

automatically receive specified fixed answers. Thus, the clerk input program may be tailored to the needs of the particular DBAC.

Specific capabilities provided by the ORDERTYPE program include the ability to print the order-type file, insert new order types, modify existing order types, and delete order types.

11.6 Report-generating programs

There are several programs which have been provided to allow the administrator to monitor the performance and status of the DBAC. All of these programs must be run manually by the administrator. Three of the programs provide daily operational statistics. These programs and their functions are as follows:

ACTSTAT	Provides counts of the number of inserts, modifications, and deletes of BNRs on a per-BNG or per-telephone company basis during a given day.
CLERKSTAT	Provides clerk performance statistics such as average work time per update, clerk sessions cancelled, total time logged in, etc. One to eight summary reports may be generated.
LINKSTAT	Provides statistics regarding the health of all BX.25 data links.

Other report-generating programs are run on an as-needed basis to investigate possible system trouble conditions and to assist the system administrator or operator with system shutdowns and restarts and file management. These programs and their functions are as follows:

AUDPRINT	Provides a summary of DBAS/BVA audit reports on a BNG basis.
BVAPRINT	Provides a printout of the daily BVA transmission file on a BNG or BNR basis.
SYSTAT	Provides a report of all processes active in the DBAS at the time SYSTAT is run.
FILES	Provides a list of files accessible to various DBAS processes. The owner and size of the file, and date and time of last modification are given for each file.

XII. DATA BASE ADMINISTRATION CENTER

The DBAC is responsible for the administration of the intercept number data used by AIS and the Calling Card Service data stored in the DBAS and BVAs. The DBAS is in the Operator Services organization

and is typically managed by one second-level manager and one to three first-level supervisors.

The DBAC uses the DBAS as the principal means of administering the contents of BVAs. The DBAC also uses the direct terminal to the BVA as backup for DBAS outages and for certain administrative functions of an infrequent nature.

The DBAC activities can be separated into the following categories: (*i*) Administration, (*ii*) Updates, and (*iii*) Support.

12.1 Administration

The administrative responsibilities of the DBAC include the creation and maintenance of a data base environment in the DBAS and BVA which will allow for the storage of BNRs and their subsequent access and use by the CCIS network for call-processing purposes. The activities required to do this are as follows:

(*i*) Programming of the DBAS nongeneric parameters via SYSGEN.

(*ii*) Creation of the necessary tables, records, and files in the DBAS to allow updating. These are BNG records (created and maintained for each NPA-NXX and RAO-0/1XX assigned to the DBAS location), Class of Service Translation Table, Access Restriction Tables, and Ordertype File.

(*iii*) Coordination and negotiation with AT&T Long Lines to ensure CCIS and BVA availability. The DBAC must also coordinate the establishment of new BNGs and the migration of BNGs between BVAs or DBASs.

(*iv*) Administration of RAO validation and the check-digit algorithm. The DBAC inputs the check-digit algorithm as provided by AT&T and sets the transition indicators as required for RAO and algorithm changes.

(*v*) Schedule audits and perform necessary actions to resolve inconsistencies. The DBAC runs audits between the DBAS data base and the BVA. Regular audits are under program control, but the DBAC also initiates demand audits as required. The DBAC is responsible for resolution of audit inconsistencies to ensure accurate DBAS and BVA data.

(*vi*) Perform DBAS file backups at prescribed intervals and, if required, restore the DBAS and BVA files. Backup of the DBAS system disk is done each working day and backup of the DBAS data base is done once a week. Restoration of the DBAS and the BVA is done utilizing the backup disks and journal tapes retained for that purpose.

12.2 Updates

The DBAC is responsible for the entering of updates into the DBAS. Updates may be entered by data link, magnetic tape, or clerk work

station. The DBAC must initiate the appropriate DBAS programs to allow input from the above-mentioned sources. The DBAC must resolve any incomplete or erroneous update information received by the DBAS.

The DBAC must also run the pending order processor daily to update Calling Card Service information in a timely manner.

If the DBAS or the data link between the DBAS and BVA is not operational, the DBAC must update the BVA with the DBAC/BVA terminal to ensure accurate call processing.

12.3 Support

The DBAC is responsible for the analysis, resolution, and clearance of data base trouble reports. Trouble reports are typically received from Centralized Repair Service, Answering Bureaus, Repair Service Bureaus, Business Service Center, and Residence Service Centers. In addition to these centers, clearance of trouble reports may also involve interaction with comptrollers, public services, AT&T Long Lines, and TSPS Operator Services Facilities Administration.

The DBAC monitors the operational status of the DBAC equipment including the DBAS, data sets, and terminal equipment. This includes analyzing hardware/software problems and ensuring that corrective action is taken. The DBAC is also responsible for ensuring the proper storage, cleaning, and transportation for magnetic tapes and disk units.

The DBAC must ensure that BNG data maintained at the BVA are accurate by reviewing all enabled services by BNG and reviewing all query addresses assigned to the BVA(s). In addition, the DBAC coordinates with the AT&T Long Lines Engineering and Network Administration Center to ensure proper CCIS network and BVA operation, including matters concerning translations, migration, and data links.

The DBAC also initiates all special studies performed at the DBAS or BVA and reviews the BVA counters and reports and takes corrective action, if required.

XIII. SUMMARY

The DBAS was designed to bridge the gap between the business office and a new user of business office data, the SPC network. The DBAS interfaces with the various telephone company SOSS, which range from totally automated to totally manual, to obtain the information needed by the network to provide its services. The DBAS keeps a superset of the data needed by the BVAs in an internal data base so that many administrative functions, such as customer inquiries and special studies, can be processed by the DBAS; this relieves on-line network nodes from having to store extra data and process extra transactions which are not call related. After cleansing and ordering the service order data it receives, the DBAS provides initial load and daily update capability

to the BVAs it administers by way of data-link transmission. In case of a massive failure at a BVA, the administering DBAS can reload the BVA's data.

XIV. ACKNOWLEDGMENTS

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